

## IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of: **BOX PATENT APPLICATION**  
Eric BENAZZI et al. Examiner: Unassigned  
Serial No.: Unassigned Group Art Unit: Unassigned  
Filed: January 15, 2002

Title: CATALYST THAT COMPRISES A SILICA-ALUMINA AND ITS USE IN  
HYDROCRACKING OF HYDROCARBON FEEDSTOCKS

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination, Applicants wish to amend the above-identified application as indicated below:

**IN THE CLAIMS:**

Please amend the claims as follows:

1. (Amended) A catalyst that comprises at least one hydro-dehydrogenating element and a substrate that comprises at least one silica-alumina, whereby said silica-alumina has the following characteristics:

- a content by weight of silica of 10-60% by weight,
- a sodium content that is less than 300 ppm by weight,
- a total pore volume of between 0.5 and 1.2 ml/g,

- the volume of mesopores with a diameter of between 40-150 Å, and a mean diameter of between 80-120 Å represents 30-80% of the total pore volume,
- the volume of macropores with a diameter that is greater than 500 Å represents 20-80% of the total pore volume, and
- a specific surface area that is greater than 200 m<sup>2</sup>/g.

2. (Amended) A catalyst according to claim 1, in which the silica-alumina comprises Al<sub>VI</sub> (octahedral) radicals and Al<sub>IV</sub> (tetrahedral) radicals, whereby the proportion of the tetrahedral Al<sub>IV</sub> is between 20 and 40%.

3. (Amended) A catalyst according to claim 1, in which the silica-alumina comprises 30-50% of Q<sup>2</sup> radicals, in which an Si atom is linked to two Si or Al atoms and to two OH groups and also comprises 10-30% of Q<sup>3</sup> radicals in which an Si atom is linked to three Si or Al atoms and to an OH group.

4. (Amended) ~~Catalyst~~ A catalyst according to one of the preceding claims claim 1, that contains boron and/or silicon.

5. (Amended) A catalyst according to claim 1, that contains at least one element that is selected from among groups VIIA, VIIIB, and VB.

6. (Amended) A catalyst according to claim 1, in which the substrate is constituted by silica-alumina.

7. (Amended) A catalyst according to claim 1, whose substrate comprises 1-40% by weight of binder.

8. (Amended) A catalyst according to claim 7, in which the substrate results from the mixture of said silica-alumina and at least one binder that is selected from the group that is formed by silica, alumina, clays, titanium oxide, boron oxide and zirconium.

9. (Amended) A catalyst according to claim 1, that has undergone a sulfurization treatment.

10. (Amended) A process for hydrocracking with a catalyst according to claim 1, at a temperature that is greater than 200°C, a pressure that is greater than 0.1 Mpa, with an amount of hydrogen of at least 50 l/l of feedstock, and with an hourly volumetric flow rate of 0.1 to 20 volumes of feedstock per volume of catalyst and per hour.

11. (Amended) A process according to claim 10 for the hydrocracking of feedstocks that are selected from the group that is formed by kerosenes, gas oils, vacuum gas oils, atmospheric residues, vacuum residues, atmospheric distillates, vacuum distillates, heavy fuels, oils, waxes, paraffins, waste oils, deasphalting residues, deasphalting crudes, the feedstocks that are obtained from thermal conversion or catalytic conversion processes, whereby the feedstocks contain less than 30% by weight of paraffins.

12. (Amended) A process according to claim 10, wherein the feedstock is first hydrotreated.

13. (Amended) A process according to claim 10, in which the hydrocracking is carried out in two stages with intermediate separation, whereby the catalyst is used in at least one stage.

14. (Amended) A process according to claim 10, in which the feedstock contains less than 25% by weight of paraffin.

Please add the following new claim:

--15. A catalyst according to claim 1, wherein the volume of macropores in said silica-alumina is 20-70% of the total pore volume.--

**REMARKS**

A principal purpose of this Preliminary Amendment is to remove the multiply dependent claims and avoid the fee associated therewith, applicant reserving the right to reintroduce claims to canceled combined subject matter.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached page is captioned "**Version With Markings To Show Changes Made**".

Respectfully submitted,

  
I. William Millen (Reg. No. 19,544) 30595  
Attorney for Applicant(s)

MILLEN, WHITE, ZELANO  
& BRANIGAN, P.C.  
Arlington Courthouse Plaza 1, Suite 1400  
2200 Clarendon Boulevard  
Arlington, Virginia 22201  
Telephone: (703) 243-6333  
Facsimile: (703) 243-6410

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**Version With Markings To Show Changes Made**

**In the Claims**

The claims have been amended as follows:

1. (Amended) Catalyst A catalyst that comprises at least one hydro-dehydrogenating element and a substrate that comprises at least one silica-alumina, whereby said silica-alumina has the following characteristics:
  - A a content by weight of silica of 10-60% by weight,
  - a sodium content that is less than 300 ppm by weight,
  - a total pore volume of between 0.5 and 1.2 ml/g,
  - the volume of mesopores with a diameter of between 40-150 Å, and a mean diameter of between 80-120 Å represents 30-80% of the total pore volume,
  - the volume of macropores with a diameter that is greater than 500 Å represents 20-80% of the total pore volume, and
  - a specific surface area that is greater than 200 m<sup>2</sup>/g.
2. (Amended) Catalyst A catalyst according to claim 1, in which the silica-alumina comprises Al<sub>VI</sub> (octahedral) radicals and Al<sub>IV</sub> (tetrahedral) radicals, whereby the proportion of the tetrahedral Al<sub>IV</sub> is established between 20 and 40%.
3. (Amended) Catalyst A catalyst according to ~~one of the preceding claims~~ claim 1, in which the silica-alumina comprises 30-50% of Q<sup>2</sup> radicals, in which an Si atom is linked to two Si or Al atoms and to two OH groups and also comprises 10-30% of Q<sup>3</sup> radicals in which an Si atom is linked to three Si or Al atoms and to an OH group.

4. (Amended) Catalyst A catalyst according to ~~one of the preceding claims~~ claim 1, that contains boron and/or silicon.

5. (Amended) Catalyst A catalyst according to ~~one of the preceding claims~~ claim 1, that contains at least one element that is selected from among groups VIIA, VIIIB, and VB.

6. (Amended) Catalyst A catalyst according to ~~one of the preceding claims~~ claim 1, in which the substrate is constituted by silica-alumina.

7. (Amended) Catalyst A catalyst according to ~~one of the preceding claims 1 to 5~~ claim 1, whose substrate comprises 1-40% by weight of binder.

8. (Amended) Catalyst A catalyst according to claim 7, in which the substrate results from the mixture of said silica-alumina and at least one binder that is selected from the group that is formed by silica, alumina, clays, titanium oxide, boron oxide and zirconium.

9. (Amended) Catalyst A catalyst according to ~~one of the preceding claims~~ claim 1, that has undergone a sulfurization treatment.

10. (Amended) Process A process for hydrocracking with a catalyst according to ~~one of the preceding claims~~ claim 1, at a temperature that is greater than 200°C, a pressure that is greater than 0.1 Mpa, with an amount of hydrogen of at least 50 l/l of feedstock, and with an hourly volumetric flow rate of 0.1 to 20 volumes of feedstock per volume of catalyst and per hour.

11. (Amended) Process A process according to claim 10 for the hydrocracking of feedstocks that are selected from the group that is formed by kerosenes, gas oils, vacuum gas oils, atmospheric residues, vacuum residues, atmospheric distillates, vacuum distillates, heavy fuels, oils, waxes, paraffins, waste oils, deasphalts, deasphalts, the feedstocks

that are obtained from thermal conversion or catalytic conversion processes, whereby the feedstocks contain less than 30% by weight of paraffins.

12. (Amended) ~~Process A process according to one of claims 10 to 11 claim 10,~~ wherein the feedstock is first hydrotreated.

13. (Amended) ~~Process A process according to one of claims 10 to 12 claim 10,~~ in which the hydrocracking is carried out in two stages with intermediate separation, whereby the catalyst is used in at least one stage.

14. (Amended) ~~Process A process according to one of claims 10 to 13 claim 10,~~ in which the feedstock contains less than 25% by weight of paraffin.

Claim 15 has been added.